AN ECOLOGICAL ANALYSIS

OF THE

IDAHO PRIMITIVE AREA

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PREFACE

This report is based on several weeks of field investigation during 1970 and 1971. It was prepared as a contribution to the general study of the Idaho Primitive Area under provisions of the Wilderness Act (P. L. 88-577). Detailed data was gathered from 81 sites within the area. Other parts of the reported information are based on observation and deduction. The inadequacies and incompleteness of this analysis are well recognized.

The question of classification of the Primitive Area for wilderness versus nonwilderness administration poses valid political alternatives but does not, of itself, pose any biological alternatives. The biological alternatives arise only in terms of those practices and events that may result from different management approaches. The ramifications of various strategies create such a complexity of potential primary and secondary biological responses that they cannot all be enumerated in this report. Instead, the general behavior of the ecosystem and some predicted responses to past and potential events are described to illustrate the sort of interactions that may be involved. For the most part, ecological response must be dealt with on a site-by-site basis.

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I. INTRODUCTION

The Idaho Primitive Area is predominantly a forested region characterized by extremes in physical site factors. It includes a number of distinct areas, each with its own special characteristics. Complex topography and a wide range of local and microclimatic variability provide the primary control on distribution of vegetation.

The Chamberlain Basin (Unit 1) and Salmon River breaks (Unit 2) areas seem to be closely related, both in physiography and physiognomy, to the region to the north. Much of the remainder of the Primitive Area is generally similar to the bulk of the mountainous portion of central Idaho. The Bighorn Crags (Unit 4) area stands unique from the rest, both as to vegetation and physical characteristics.

The structure and development of natural plant communities has been substantially altered in some areas by wildfire and excessive grazing of domestic livestock and big game animals. Fire has exerted its greatest influence in the Chamberlain Basin, Salmon River breaks, and Monumental Creek (Unit 3) areas, while grazing has had its greatest effect in the Middle Fork breaks (Unit 5). Some areas, particularly in Monumental creek, were modified by man's activities during the early mining days.

The most appropriate ecological generalization that can be made about the Primitive Area is its broad scale diversity which has resulted in a large and varied array of habitat niches supporting a highly varied population of flora and fauna. Most environmental factors span broad ranges that vary widely from place to place. The near 8000-foot elevational gradient, steep slopes with sharply contrasting exposures, geographic dimension, variations in parent materials, and other factors all

contribute to high diversity. Sharp contrasts frequently occur in close proximity to each other. Seldom do ecological relationships apply to more than a limited span of situations and the range and discontinuity of variability makes extrapolation hazardous. Because of this it is hazardous to generalize when speaking of ecological behavior in the Primitive Area.

Due to its size, the floristics of the area were not studied in depth but it is estimated that 600-700 species of vascular plants occur. Flora of the main Salmon River corridor differs substantially from that of the remainder as does the alpine/subalpine flora of the Bighorn Crags area.

It appears that the Primitive Area intersects a portion of the contact zone between major regional floras. Vegetation of the Salmon River breaks, Chamberlain Basin, and some other limited areas has developed primarily from Northern Rocky Mountain flora. The central and southern portions are most strongly influenced by Wasatch Mountain and Great Basin flora.

II. VEGETATION CLASSIFICATION AND DESCRIPTION

Five major vegetation zones are recognized. Each has been characterized by its dominant plant species (usually trees). The zones, in turn, are each a composite of one or more associations and community types. On a temperature/moisture gradient the zones are positioned from warm-dry to cool-moist in the order: bunchgrass, ponderosa pine, Douglas-fir, spruce-subalpine fir, and whitebark-limber pine. They sometimes occur as sequential belts on an elevational gradient but, because of topographic irregularity, will often interfinger or be discontinuous. There is a common tendency for species and associations, occupying modal sites in one zone, to occur on moist cool sites in the adjacent warmer and drier zone and on warm dry sites in the adjacent cooler and moister zone.

The general distribution, major components, and characteristics of each zone are described as follows:

A. Bunchgrass Zone

The nonforested bunchgrass zone is largely confined to dry southerly exposed slopes in the Middle Fork breaks between Pistol Creek and Big Creek. The vegetation has been significantly modified by past overgrazing and many of the existing plant community types represent various regressional stages.

The zone is unforested because of annual conditions of soil drought and very high soil and surface summer temperatures that exceed the tolerance limits of those tree species present in the general area. However, several shrub species are able to tolerate the warm xeric environment. As conditions are modified by increased elevation and on the toeslope

and river terrace positions (more favorable moisture/temperature conditions) ponderosa pine is able to establish quite successfully.

Photos 2-1 and 2-2 - Panoramic view of the bunchgrass zone adjacent to the Middle Fork.

The zone provides the principal winter range for mule deer in the Primitive Area and is the wintering area for substantial populations of elk and bighorn sheep as well. It is characterized in its natural state by a general dominance of bluebunch wheatgrass (Agropyron spicatum). Although several other community types are also represented, the most common are the bluebunch wheatgrass/bitterbrush/balsamroot and the curl-leaf mahogany/outcrop types. The former has been substantially modified and now occurs as several secondary regressional communities. Annual cheatgrass brome (Bromus tectorum) has become an important component of the composition in most places.

Herbaceous species most common in the zone include bluebunch wheatgrass, cheatgrass brome and arrowleaf balsamroot (Balsamorhiza sagittata). Shrubs that are well represented include bitterbrush (Purshia tridentata), big sagebrush (Artemisia tridentata), curlleaf mountain mahogany (Cercocarpus ledifolius), and rabbitbrush (Chrysothamnus nauseosus). Some common associates are longleaf phlox (Phlox longifolia), silky lupine (Lupinus sericeus), phacelia (Phacelia hastata), and stickseed (Hackelia floribunda).

Photo 1-10 - A dry bunchgrass site in near-natural condition.

Photo 2-4 - A cooler more moist bunchgrass site adjacent to the ponderosa pine zone.

Bluebunch wheatgrass is rather intolerant to grazing pressure and it is thought that it can develop as a primary component of the vegetation only under conditions of minimal herbivore use. Its presence as a dominant in the natural vegetation of this zone suggests that the historic populations of bighorn sheep did not exert heavy grazing

pressure here. Shifts to domestic sheep, mule deer and elk as primary consumers concentrated very heavy grazing pressure in the zone and resulted in significant deterioration of the natural vegetation. Many of the plant species now common are those that could take advantage of the altered situation or could tolerate the change in grazing pattern. The nature of grazing stress now on the area, together with modifications that have occurred in the site itself, make a return to the original composition problematic on most sites.

B. Ponderosa Pine Zone

In the Primitive Area, the ponderosa pine zone is generally limited to elevations below 5500 feet, adjoining the Douglas-fir zone at its upper extremity. The largest block of the zone is in the lower Chamberlain Creek-McCalla Creek area where it coincides closely with the boundary of the geomorphic subprovince characterized as "low relief fluvial lands." Much of the ponderosa pine type in this area represents the upper portion of the zone where Douglas-fir is able to establish sporadically. As a result, mixed stands occur frequently. However, lodgepole pine is rather uncommon in the zone. The typical ponderosa pine stand is all aged with the oldest veterans reaching 600 years of age.

A belt of the zone occurs in the Middle Fork area above the bunchgrass zone. In this area, it also occurs intermittently on the toeslopes and river terraces below the bunchgrass zone wherever the temperature/moisture conditions are favorable.

Understories are variable but, except for tree reproduction, are usually open and parklike. This is an apparent response to episodic

Photos 13-12 and 14-3 - Typical all-age ponderosa pine stands.

wildfire. Pinegrass (Calamagrostis rubescens) is the most common understory dominant. Other important species that achieve local dominance in some places include elk sedge (Carex geyeri), Idaho fescue (Festuca idahoensis), spreading dogbane (Apocynum androsaemifolium), creeping barberry (Berberis repens), bearberry (Arctostaphylos uva-ursi), and ninebark (Physocarpus malvaceus). Important associates are slender penstemon (Penstemon gracilis), yellow hawkweed (Hieracium albertinum), lupines (Lupinus spp.), pussytoes (Antennaria spp.), sedge (Carex concinnoides), yarrow (Achillea millefolium), and heartleaf arnica (Arnica cordifolia). Sometimes, in the ecotone abutting the bunchgrass zone, both bluebunch wheatgrass and arrowleaf balsamroot may maintain an understory dominance well into the ponderosa pine zone.

C. Douglas-fir Zone

The Douglas-fir zone occurs rather generally throughout the Primitive Area at mid-elevations, on southerly exposures at higher elevations, and on north exposures at lower elevations. It includes most of the Salmon River breaks, a large part of the Chamberlain Basin and significant, but intermittent, portions of the remainder. It is usually bordered on its lower boundary by the ponderosa pine zone and on its upper by the spruce/subalpine fir zone. The upper boundary is often obscured by an ecotone that is sometimes quite broad.

Seral brushfield, meadow, and sagebrush/grass types occur as isolated and intermittent occlusions in the zone. An Engelman spruce community type may occur as pockets in cool moist coves and as stringers along some streams. The Douglas-fir association includes Douglas-fir/pinegrass, Douglas-fir/ninebark, and Douglas-fir/mixed shrub plant community types. Of these, the pinegrass type is the most common and widespread. As a

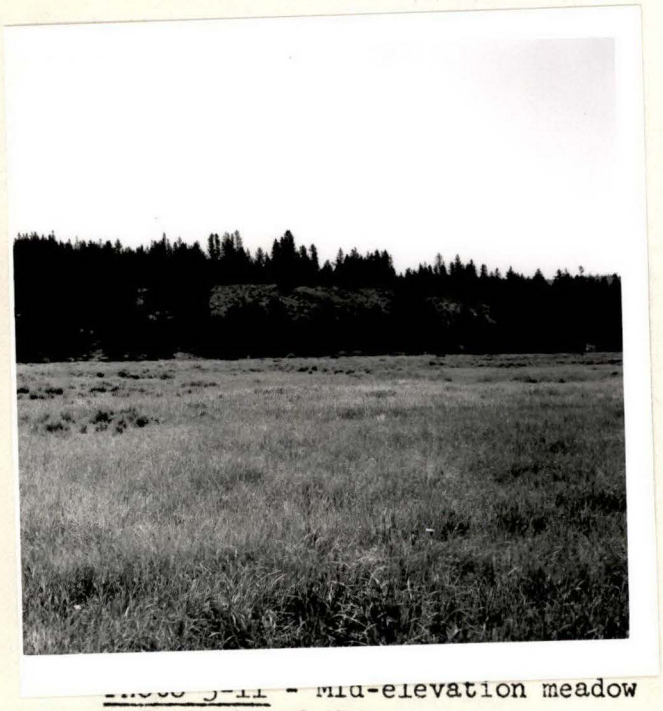

Photo 13-11 - Mid-elevation meadow and sagebrush types.

Photo 13-7 - Typical seral lodgepole pine type.

result of past wildfire disturbance, large areas in the zone are now occupied by a seral lodgepole pine overstory. Lodgepole pine communities are particularly abundant in the Chamberlain Basin and Monumental Creek areas.

The Douglas-fir type normally occurs as an all-age stand in which the oldest veterans may approach 300 years of age. Sometimes, as a result of past wildfire, younger even-age stands may occur. These are developmental stages in the Douglas-fir association.

The understory is most commonly dominated by pinegrass but several other species are important components that, in places, are locally dominant. These include Idaho fescue, elk sedge, Wheeler bluegrass (Poa nervosa), buckbean (Thermopsis montana), sickletop lousewort (Pedicularis racemosa), European strawberry (Fragaria vesca), heartleaf arnica, spirea (Spiraea betulifolia), creeping barberry, grouse whortleberry (Vaccinium scoparium), bearberry, and ninebark.

Photo 13-10 - Mature Douglas-fir stand with lodgepole pine reproduction.

Understories beneath the seral lodgepole pine stands tend to be predominantly of grouse whortleberry, pinegrass, and bearberry in the older stands and buckbean, fireweed (Epilobium angustifolium), yarrow, milkvetch (Astragalus paysonii), and other burn succession relicts in the younger stands.

Photo 11-2 - Douglas-fir mixed shrub community.

Photo 20-12 - Mature Douglas-fir/pinegrass community.

D. Spruce-Subalpine Fir Zone

This zone is dominant in the cooler humid climatic region at elevations generally above 7000 feet. It is characterized in the forested overstory by subalpine fir with Engelmann spruce occurring separately or in mixtures. Lodgepole pine is a common seral associate. The zone occupies the upland portions of Chamberlain Basin and upper north slopes, basins and smooth ridges throughout the Primitive Area.

Meadow types extend into this zone and south exposure sagebrush-grass types may occur. The latter situation tends to gradiate into a mountain grassland type with Idaho fescue and needlegrasses (Stipa spp.) as common dominants.

Photo 4-5 - A high elevation mountain grassland community.

Photo 4-1 - Understory in dense subalpine fir forest.

Canopies in the forested sites are typically dense and understory yields are low. In the upper part of the zone, the forest often becomes more patchy and a parkland aspect predominates. Understories

Photo 20-5 - A subalpine fir/grouse whortleberry community.

Photo 20-7 - An Engelmann spruce pocket.

Photo 21-6 - A subalpine fir burn not yet reforested.

Photo 17-2 - Beargrass community.

are typically dominated by one or only a few species with grouse whortleberry, elk sedge, and heartleaf arnica being the more common. A beargrass (Xerophyllum tenax) community often develops on the more mesic sites.

Burned-over areas, particularly in the upper part of the zone, are sometimes slow to reforest and a number of open higher elevation slopes can be found which represent this successional stage.

E. Whitebark-Limber Pine/Barren Zone

This zone is characterized by rugged peaks, high and often barren ridges, and glaciated basins at the highest elevations. It consists of a mosaic of subalpine parkland, meadow, whitebark-limber pine, and fragmented spruce-subalpine fir communities, as well as lakes and extensive areas of barren rock outcrops and peaks. Forest cover is typically sparse and patchy. The zone is actually an ecotone between the spruce-fir and true alpine communities. Although frequently referred to as "alpine," it is better described as a subalpine or timberline mosaic in which some alpine species occur. True alpine communities are not well developed and an alpine zone is not recognized.

The zone is important mountain goat habitat and frequently supports summer populations of bighorn sheep as well. It reaches its best expression in the Bighorn Crags but is also found on many of the high rocky ridges throughout the Primitive Area.

Photos 2-8 and 2-9 - Aerial views of the Bighorn Crags Area.

Photo 17-12 - Bighorn sheep.

Photo 21-12 - Whitebark-limber pine community type.

Photo 5-1 - Skeletons of beetle-killed whitebark-limber pine.

Except for the extensive areas of glacially scoured bedrock and rugged, barren outcrop, the zone is best depicted by the whitebark-limber pine community type. This type usually occurs on high ridges and upper slopes near timberline. Here, individual trees in excess of 750 years of age may occur but the bulk of the stands are 110 years of age or less. Standing skeletons of beetle-killed trees are a trademark of the type.

The most widespread understory species in the whitebark-limber pine type are millet woodrush (Luzula parviflora), grouse whortleberry

(Vaccinium scoparium), Ross sedge (Carex rossii), elk sedge (Carex geyeri), little ricegrass (Oryzopsis exigua), Wheeler bluegrass (Poa nervosa), stemless sandwort (Arenaria aculeata), and Parry rush (Juncus parryi). Some of the more common associates are hairy arnica (Arnica mollis), slender hawkweed (Hieracium gracile), slender penstemon (Penstemon gracilis), and snowlover (Chionophila tweedyi). Ground cover is typically 35-50 percent and understory yields seldom exceed 100 pounds dry weight per acre. Species dominance in the understory varies from place to place, often resulting in a locally patchy appearance.

The zone also provides the setting for the so-called "alpine flower gardens" of the forb parkland community. Here, a profusion of forb species lend color to the ruggedness of their setting. The main contributors are species such as asters (Aster spp.), daisies (Erigeron spp.), paintbrush (Castilleja spp.), low goldenrod (Solidago multiradiata), species of arnica, shootingstar (Dodecatheon jeffreyi), lupines (Lupinus spp.), fireweed, bluebell (Mertensia ciliata), and groundsel (Senecio spp.).

III. ECOLOGICAL EVALUATIONS

Several apparent biological interactions and matters of ecological interest were identified. These are discussed independently and in a random chronology as follows:

A. Wildfire Patterns

Probably the most widespread natural relationship is that of the influence of wildfire on existing vegetation community patterns. It is probably the dominant influence in the Salmon River breaks (Unit 2), Chamberlain Basin (Unit 1), and Monumental Creek (Unit 3) areas. Much of the acreage in these areas has burned within the past 100+ years and the present vegetation constitutes various stages of burn succession. Wildfire is of particular importance in influencing overstory vegetation patterns.

It is interesting to note that lodgepole pine is a dominant seral opportunist following wildfire in Douglas-fir and spruce-fir types in the Chamberlain Basin and Monumental Creek areas, whereas, the species was not observed even to occur in the adjacent Salmon River breaks area. In the latter case, Douglas-fir succeeds itself following wildfire. The reason for this striking difference has not been determined.

Although wildfire has certainly been an environmental factor on much of the remainder of the Primitive Area, it does not appear to have achieved the level of general importance there as in the above units. Even so it has been locally important in creating landscape diversity.

Age of fire scars, even-age stand ages, and similar empirical evidence fails to indicate any clear pattern to historic wildfire event. The periodicity or cyclic characteristic of wildfire events that is

apparent in other nearby areas does not seem to be the case here. An interesting contradiction is the near absence of lodgepole pine stands exceeding 100 years of age. Fires were apparently more widespread (and perhaps larger) during the period 1870-1900 than at other times but data and records identify burns at irregular intervals from about 1850 to the present. Available evidence suggests a rather heterogeneous array of historic wildfires, both as to time, size, and location.

Fire occurrence records for the period 1960-70 show that man-caused fires represent less than 10 percent of the total. The same ratio is true for larger fires and probably holds for burned acreage. This evidence suggests that wildfire is still primarily a natural event as it was historically and that man has had but minor influence on fire occurrence. The effect of modern suppression efforts on size and spread of natural wildfires is another matter and man's influence here may be of more significance. One exception to these conclusions is the apparent increasing incidence of man-caused fires along the Middle Fork.

The existing wildfire/plant community relationships have developed under a quasi-natural condition where human densities are sparse and localized. Management alternatives that result in increased human density and activity can be expected to influence fire occurrence, location, and size. This will indirectly influence the successional development of plant communities.

B. Consumers

The past 100 years have seen major changes occur in the kinds and numbers of primary consumers (herbivores) within the Primitive Area. A prewhiteman condition of ecosystem stability (balance between floral-faunal populations) has been substantially altered and a condition of instability now exists.

The principal natural herbivore of the area was probably bighorn sheep, with lesser numbers of elk and mule deer, and a few mountain goats. Populations of these animals were in a state of natural equilibrium with predator populations and with the forage and habitat needs of the species.

Populations of all primary consumers were substantially reduced during the early mining days when large numbers of these animals were killed for food and hides. This unregulated hunting was the first major stress on ecosystem equilibrium.

A second major stress occurred with the introduction of large populations of domestic herbivores (sheep and cattle) into the area. Major effects on ecosystem stability were twofold: (1) the remaining population of bighorn sheep was decimated by disease following introduction of disease organisms with the domestic sheep, (2) the unregulated grazing of domestic sheep and cattle resulted in significant deterioration of the vegetation and a decline in forage production on key portions of the area.

A third major stress occurred when, in an effort to rebuild big game populations, an intensive predator control program was undertaken. This action, along with reduced prey populations, resulted in a decline in predator (secondary consumer) population. Very soon thereafter, mule deer populations erupted and further deterioration of the vegetation on deer winter ranges occurred. Somewhat later, the elk population also began to increase significantly, a trend that has continued to the present time.

Events resulting in the last major stress were twofold. Major winter die-offs and increased hunter harvest have reduced mule deer populations significantly. Within the past two decades, all domestic sheep and cattle have been removed from the area. These two events, in combination, produced a dramatic decline in total herbivore population.

The sequence of events described here has resulted in a present condition of ecosystem instability. Kinds and numbers of primary consumers are significantly different from those of prewhiteman times under which the natural vegetation complex developed. Mule deer population, although substantially below its peak level, is well in excess of the reduced forage producing ability of critical wintering areas. The increasing elk population is imposing additional stress upon these same critical areas. Horse use (pack and saddle stock) has shown a gradual increase and creates local areas of stress although it does not appear to be significant in the total picture at this time.

The presence of small populations of moose, mountain goat, and whitetail deer add interest and value to the area but they do not appear to strongly influence the matter of ecosystem instability. On the other hand, the large population of Columbian ground squirrel must be regarded as one of the dominant primary consumers over much of the area. Population trends of this species are not known but numbers are thought to be much higher now than in the past. This is probably associated with the lesser numbers of predators and the increase in secondary plant species in the composition.

In summary, man's introduction into the ecosystem as an external force has caused major shifts in kinds and numbers of primary consumers and has created a condition of instability in some major components of the ecosystem. Although natural processes are constantly at work to restore stability, it is not now possible to return to a state of natural equilibrium. Some elements of the change cannot be restored. Therefore, some level of managed equilibrium must now be the goal, even if man's future influence is minimized.

The natural processes of restoring stability deal only in the long term. Many of the events associated with these processes will be viewed as catastrophic in the short term. Nonetheless, a new level of equilibrium will be reached sooner or later and the trends in that direction form the basis for predictions of trends for the major consumer components.

We can expect the mule deer population to continue its decline and to eventually stabilize at a level considerably below the present one and possibly below the prewhiteman level. Because elk are an adaptable species, their population will probably continue to increase for some time but will eventually drop back and stabilize at a lower level that can be supported by the then available winter range. Bighorn sheep population may hold at present levels or even increase some but are unlikely to return to prewhiteman levels. The introduction and retention of disease organisms into the ecosystem and the alteration to less productive levels of portions of their available habitat preclude this. There is no basis for predicting change in whitetail deer, moose, or mountain goat populations. Predators, if left to their own device, will reach a state of equilibrium with prey populations. This will probably mean an initial increase in predator numbers but eventual stability at levels similar to now.

The key to this entire process of restoring equilibrium rests with the condition of the wintering area (primarily the bunchgrass zone in the Middle Fork breaks) and its capability to produce forage. It is unlikely that this area will return to its prewhiteman productivity level, either naturally or through artificial rehabilitation efforts. At any rate, it will require a very long time to do so.

The above predictions assume a quasi-natural condition and a minimum of new interference by man. It is recognized that many past man-caused stresses and their consequences will continue to interfere with natural trends. It is also recognized that the likely inputs of human effort into the ecosystem may tend to modify the predicted trends, either in time or direction. Some efforts will work to enhance some components while others will probably be disruptive.

It is interesting to note that the reputation of the Idaho Primitive Area as a "hunter's paradise" is based on inflated big game populations that developed following disruption of ecosystem stability by man. When equilibrium is eventually restored, the proportions of various big game species will surely be different and probably less abundant than in prewhiteman times.

C. Successional Patterns

Vegetation successional patterns following wildfire and other catastrophic events within the Primitive Area have not been adequately studied. However, some parts of several successional sequences are fairly well understood and are discussed in this section.

The occurrence of catastrophic events plays an important role in the nutrient/energy exchange processes of ecosystem function and of productivity. They also are important in creating diversity and, hence, in ecosystem stability.

Forested sites from which tree overstory has been removed or substantially reduced can be expected to eventually return to a forested state if physical characteristics of the site are not substantially altered. The time lapse before the original or some other tree species reestablishes on the site may range from a year or two to a century or more depending upon a variety of factors.

Sites were observed on which tree seedlings were establishing along with the early herbaceous and shrubby pioneers. Other sites undergo rapid regeneration after a decade or two. Still others undergo a successional sequence in the understory for some time with tree regeneration occurring gradually over an extensive period of time. Occasionally,

a site is reoccupied by mountain grassland type and the gradual re-invasion of forest requires a very long time.

Differences in successional behavior following wildfire are apparently a function of the interaction of several factors. The more important of these are (1) character of the burn itself and the kind of situation that remains after burning, (2) the degree to which the fire and its aftereffects alter the physical characteristics of the site, (3) available seed source for tree species, (4) chance occurrence of seasons favorable for germination and seedling establishment subsequent to the burn, and (5) capability of available tree seedlings to compete with seral successional species.

Succession following insect and/or disease depredation is typically somewhat different than that following wildfire. In this case, understory and physical characteristics of the site are altered but little, if at all. The overstory is thinned but not removed, thus allowing only moderate light intensities to penetrate. All of these conditions tend to favor regeneration of the natural climax overstory for the site.

Because the successional behavior following overstory removal is so complex, predictions of successional sequences are limited to general patterns rather than specifics. Several of these general patterns were observed in the Primitive Area and most of them were investigated on site. The successional behaviors described below all occur within the Primitive Area.

Bunchgrass (nonforested)

Vegetation in this zone has already undergone two regressional changes as a result of excessive grazing in the past. First, the introduction of large populations of domestic livestock into the area placed

intolerable stress on the perennial bunchgrass component. As a result, bluebunch wheatgrass declined, shrubby species increased, and the general thinning of ground cover allowed species such as cheatgrass brome to invade in abundance. These changes, along with other factors, created a condition favorable for eruption of mule deer populations. The result was a shift in grazing pattern and excessive stress was placed on shrub species. Their decline, and the inability of bunchgrasses to respond (they were not competitively viable under these conditions), allowed for still further increases of cheatgrass brome and other weedy pioneer species. Subsequent removal of most domestic livestock, major decline in mule deer population, and an increasing elk herd have now created still another pattern of stress. Under present stress levels, shrub species have not been able to respond, bunchgrasses have some competitive advantage but their response is very slow, and the weedy pioneers are able to retain a strong position. It was observed on some protected sites that longleaf phlox (Phlox longifolia) is tending to replace cheatgrass in the interspaces.

The effect of wildfire on these sites is to further handicap shrub species (except for those that sprout freely) and to create site conditions favorable to maintenance and/or further increases in cheatgrass. Removal of ground cover by fire also increases soil temperatures, often results in loss of soil and fertility, and induces more xeric conditions. These changes create a harsh environment for establishing perennial climax species and clearly favor annuals and weedy perennials. Typical regression stages following wildfire in this zone are more flammable and more susceptible to reburn than were their predecessors

Ponderosa pine

Wildfire does not seem to be a strong factor in the successional development of ponderosa pine stands. This species has high tolerance to fire after it has passed the sapling stage. The principal effects of wildfire are in the understory but, even here, they do not appear to be either major or persistent. The proportion of shrubs in the understory is probably influenced directly by the frequency of wildfire. Frequent ground fires usually result in a grassy parklike understory.

An interesting, and somewhat different, competitive interaction occurs in the ecotone between ponderosa pine and Douglas-fir zones. Sites representing this situation were investigated in the Skull Creek drainage in lower Chamberlain Creek. Here, the battle for site dominance has been engaged literally for centuries but, though proportions have shifted back and forth over time, neither species has established dominance and the stands remain mixed. The struggle is strongly influenced by wildfire. Because of its greater tolerance to shade, Douglas-fir would normally be expected to eventually achieve a climax dominance. The fact that it has been unable to do so is due to variable wildfire responses and to the difference in normal longevity between the two species.

The effects of a single wildfire event that decimates understory but leaves the older overstory intact should favor regeneration of Douglas-fir because of its greater shade tolerance. Reburn on a short cycle should, in turn, shift the advantage to ponderosa pine because the species develops resistance to fire at a younger age than does Douglas-fir. Evidence suggests that past fire occurrence has been episodic but at irregular intervals, thus creating first one response and then the other.

Regeneration success is further influenced by a significant difference in expected longevity of individuals of the two species. Maximum life of Douglas-fir is about 250-300 years while ponderosa pine on this site may reach an age of 600 years. Thus, Douglas-fir must successfully establish new seedlings at twice the rate of ponderosa pine to overcome this differential.

The net result of natural combinations of these factors and their variability over time has been to maintain a mixed species overstory with no permanent advantage to either. The stalemate has persisted for many centuries and will continue indefinitely into the future under natural conditions. External interference by man can rapidly shift the balance. Removal of the overstory (i.e. clearcutting) should lead first to a shrub stage and then to ponderosa pine dominance (or lodgepole pine). Repression of wildfire should lead to success of Douglas-fir over time.

Douglas-fir

Successional patterns in the Douglas-fir zone vary from one part of the Primitive Area to another. Major differences in vegetational response to wildfire are well illustrated by the successional sequences in Chamberlain Basin compared to those of the Salmon River breaks.

Douglas-fir is the natural climax overstory for much of the Chamberlain Basin area. Present community structure and pattern are largely the result of historic wildfire. Typically, the response to removal of Douglas-fir overstory by fire results in an initial herbaceous stage in which species such as fireweed, lupine, and buckbean assume a temporary dominance. Preburn species such as whortleberry, heartleaf arnica, and pinegrass frequently persist. Herbaceous yield is drastically reduced

by the fire but usually regains its previous level within a few years. This stage is followed by rapid regeneration of lodgepole pine, often in dense doghair stands. In the absence of further wildfire, the site will then be reclaimed by Douglas-fir after one overstory generation.

Frequently, such sites are subjected to periodic reburn. The net effect of each reburn is to set the successional sequence back into the lodgepole pine stage, making restoration of Douglas-fir succeedingly more difficult. Persistence of the phenomenom tends to lock the site into a pyric climax of lodgepole pine wherein that species regularly succeeds itself. Under these conditions, a time period of several centuries without wildfire may be required to accomplish a shift back to Douglas-fir (a most unlikely circumstance).

The lodgepole pine phase, because of its reduced diversity, is vulnerable to bark beetle depredation. The initial effect of beetle kill is to rejuvenate energy/nutrient movement in the ecosystem. It is a part of the natural process of restoring ecosystem stability. Conditions on the site following such attacks tend to favor Douglas-fir regeneration and help to shift the successional sequence back in the direction of natural climax. Lodgepole pine stands on a significant portion of the Chamberlain Basin area are now approaching the stage of maximum susceptibility to bark beetles. A major epidemic can be expected in that area within the next 30 years.

Successional responses in the Salmon River breaks area are in sharp contrast to those of Chamberlain Basin. Here, too, present community structure and pattern are largely the result of historic wildfire. Dominant climax overstory through most of the area is open or closed Douglas-fir forest. The effect of wildfire here has been to enhance ecosystem stability by speeding energy/nutrient movements and by increasing

landscape diversity. These conditions tend to maximize the variety of biological niches and to encourage a diversity of floral and faunal populations.

In contrast to the typical successional response in Chamberlain Basin, lodgepole pine is not a seral opportunist in burn succession in this area. In fact, the species does not even occur in the unit. Following overstory modification by wildfire in the Salmon River breaks, the typical first stage of succession is to a brushfield type. These brushfields contain a profusion of tall mesic shrub species and are highly productive. The shrub layer includes such species as oceanspray (Holodiscus discolor), ninebark (Physocarpus malvaceus), chokecherry (Prunus virginiana), elderberry (Sambucus cerulea), redstem ceanothus (Ceanothus sanguineus), serviceberry (Amelanchier alnifolia), mockorange (Philadelphus lewisii), snowberry (Symphoricarpos rivularis), and spirea (Spirea betulifolia). This stage may persist for many years but gradually it is overtaken by Douglas-fir reproduction and returns to Douglas-fir forest. Occasionally, burned sites are rather quickly restocked with even-aged Douglas-fir which, in time (100+ years), gradually shifts to a mixed-age state. In a few places, neither shrubs nor trees are able to establish and a sodded mountain grassland occupies the site. Once established, the grassland will persist for a very long time because of the difficulty for tree reproduction to breech the closed cover. However, forest is able to eventually reinvade even these sites.

The effect of reburn in this area is generally to hold the site in the brushfield stage. Because of topographic and local climatic variability, wildfire seldom burns uniformly and the patchy remains and varied responses create the existing conditions of high diversity.

Spruce-subalpine fir

Successional response in the spruce-subalpine fir forest was investigated in Monumental Creek and in the Chamberlain Basin area where it is the dominant type in upland areas. It is assumed that response is similar in other parts of the Primitive Area. Generally, the response is much like that of the Douglas-fir forest in this area. Lodgepole pine is the common seral opportunist that dominates following wildfire. However, scattered subalpine fir usually occurs in these stands and pure stands of lodgepole pine reproduction are less common. They usually will persist for only one or two overstory generations and the lodgepole pine pyric climax is not common in this zone. Understory succession differs mainly in the occurrence of two additional forb species. Beargrass (Xerophyllum tenax) is often locally important in the herbaceous stage as is milkvetch (Astragalus paysonii). The latter species is often heavily utilized by elk.

Whitebark-Limber Pine

Most whitebark-limber pine stands are now characterized by an abundance of standing dead trees that were killed by bark beetle a few decades ago. Regeneration in these stands is typically of whitebark-limber pine with some subalpine fir and an occasional lodgepole pine. A substantial number of typical living stand dominants are 90-110 years old, suggesting that there may have been an earlier beetle epidemic about the 1850's with subsequent reestablishment of new whitebark-limber pine stands.

Where wildfires have occasionally burned in this type, it is usually restocked to subalpine fir for one overstory generation after which the site returns to whitebark-limber pine. Lodgepole pine, also, is often an important seral species under these conditions. Throughout these sequences, the understory remains little changed except that thinning of the understory often follows wildfire.

D. Miscellaneous Interactions

Elk/Douglas-fir Ridges

Elk have been observed to regularly frequent smooth upper slopes and ridges supporting open stands of mature Douglas-fir during the breeding season. Apparently such sites are used for bugling and/or rutting and may play an important role in the breeding activity. Whether or not this site requirement is vital to breeding success is not known.

Because of their limited areal extent such sites are of particular significance in the Chamberlain Basin area. They are of more frequent occurrence on the remainder of the area and are less likely to be limiting there.

Elk/meadows

Elk are known to make substantial use of meadow types in Chamberlain Basin at certain times of the year. Wing (PhD Thesis, U. of Ida., 1969) found forage utilization by elk in excess of 600 pounds per acre on some meadows. Current use patterns indicate that elk use the surrounding dense forest for shade and cover and the open meadows for foraging. It is not known whether or not this pattern constitutes a vital requirement for elk. However, increases in human activities that preclude such use of meadows by elk will, as a minimum, necessitate the shifting of grazing pressure to other unknown sites. If such use is vital or significant to their welfare, the effect would be to reduce the capability of the entire area to support elk. The present trend toward increasing human activity on many of the meadow types suggests that this interrelationship should be carefully watched and that irreversible actions affecting it be approached with caution. Further research on the significance of present use patterns of elk is needed.

Whitetail Deer

The herd unit boundary for the limited population of whitetail deer coincides quite closely with the southern boundary of the lodgepole pine/meadow complex of the Chamberlain Basin area. It is suspected that this coincidence may relate to some (as yet unidentified) habitat characteristics found in the Chamberlain Basin area but not present elsewhere in the Primitive Area.

There is a rather close correlation between the herd unit boundary and the physiographic subprovince described as "basin lands." This subprovince occurs more frequently to the northward where whitetail deer are also more common. The subprovince is not repeated to the southward.

There is also a general coincidence between the herd unit boundary and the contact zone of regional floras. Whitetailed deer are associated with the area most influenced by Northern Rocky Mountain flora.

Human Densities

The physical presence of man must also be recognized as an ecological influence, quite apart from the effects of his activities. During the prewhiteman period and through most of more recent history, human density in the Primitive Area has been very sparse. Even today, the general density is sparse but localized areas of higher density occur. The ecological implications of this localized buildup are speculative, at best, but must be recognized.

The proximity of density centers to such vital life-cycle segments as calving areas, nesting areas, breeding sites, etc., can be catastrophic to some wildlife species. Some other species demand isolation and solitude for their survival. Currently, no specific problem situations have been identified but this is the result of incomplete information--not the absence of conflict. The probabilities for developing, or at least recognizing, problem situations will increase with time.

Currently, the density of use in the Bighorn Crags Area is reaching the point where intolerable interference with mountain goats may begin to develop. Increasing human density on the Middle Fork and main Salmon Rivers is probably at or approaching a level of interference with species such as river otter whose habitat is limited to that zone. The tendency for localized densities to increase around the meadow types, particularly in Chamberlain Basin, also has potential for developing problem situations. These meadows are important foraging areas for elk during certain seasons of the year. Elk, being adaptable creatures, may possibly learn to live with high human densities but other meadow fauna may be less tolerant.

These are but examples of the kinds of interference that should be more carefully monitored. The vital requirements of various faunal species need much more investigation--in many cases research is needed. As critical segments of life cycles are daylighted, their relationship to human density will become more apparent. In the meantime, some undesirable results due to ignorance should be expected if excessive human buildups are allowed to occur.

Recreation Pack and Saddle Stock

The introduction of grazing stress by pack and saddle stock appears to be of major significance only in the Bighorn Crags Area. Here, the extreme shortage of forage areas for horses (meadow or grass type) is causing adverse responses even under present levels of use. The only cirque lake basin observed that has available forage of consequence is Welcome Lake. A meadow type of several acres borders this lake on the east and south. Even now, it is being severely abused by extremely heavy grazing. It cannot long sustain this level of stress and some evidence of deterioration is already present. Grazing stress must be relieved immediately if regression is to be avoided.

Photos 6-7, 6-8 and 6-9 - Meadow area near Welcome Lake. This is the major forage-producing area for horses in the Bighorn Crags Area.

The near absence of other forage areas for horses in the Bighorn Crags Area suggests that this type of use is incompatible with productive capabilities of the area and should be discontinued.

Photos 6-7, 6-8 and 6-9 - Meadow area near Welcome Lake. This is the major forage-producing area for horses in the Bighorn Crags Area.

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IV. UNIQUE, PRISTINE, AND/OR UNUSUAL SITUATIONS

Grand Fir Type

A small area of typical Grand Fir type occurs along the main Salmon River between Magpie Creek and Raven Creek. The overstory is of mixed Douglas-fir and Grand Fir with a 90 percent crown density. Reproduction and small trees are mostly Grand fir and the understory contains an abundance of tall mesic shrubs. Western yew occurs as scattered and isolated individuals within and peripheral to the type. The type probably represents the Grand Fir/huckleberry association that occurs in northern Idaho and the Pacific Northwest. It is an outlier from the southern range limit of that association. The type contains the following typical understory indicator species of the association.

Queencup beadlily (Clintonia uniflora)
Columbia brome (Bromus vulgaris)
Trail plant (Adenocaulon bicolor)
Sweetscented bedstraw (Galium triflorum)
Western goldthread (Coptis occidentalis)
Twinflower (Linnaea borealis)
Starry solomonplume (Smilacina stellata)
Pacific wakerobin (Trillium ovatum)
Heartleaf arnica (Arnica cordifolia)
Thimbleberry (Rubus parviflorus)
Baldhip rose (Rosa gymnocarpa)
Western prince's pine (Chimaphila umbellata)
Nootka rose (Rose nutkana)
Thinleaf huckleberry (Vaccinium membranaceum)

This plant community is unique in that it is thought to represent a recessional remnant of a type that formerly occupied a much larger area during more humid times. As the general climate began to warm and dry, many species that make up this association receded to the northward, leaving this small area as the last frontier remnant. It has been able to persist because of unique local environmental conditions that correspond to its site requirements. It is the only known representative of the association in the Primitive Area.

Photo 10-8 - Understory within the Grand Fir type.

Photo 10-9 - Outside view into the Grand Fir type.

The theory of recessional remnant is strengthened by the occurrence of another plant community type at the confluence of Wapiti Creek and Whimstick Creek from which Grand Fir and many of the typical understory members are missing but with several other herbaceous and shrubby indicators present. The overstory of this latter type is predominantly Douglas-fir with some subalpine fir and an occasional Engelmann spruce. It is thought that this site once supported Grand Fir but, because of gradual changes in site factors, that species was no longer able to compete successfully and has passed from the scene.

Photo 14-12 - Semicloseup view of the Wapiti Creek site.

The Wapiti Creek site supports the only specimen of rusty menziesia (Menziesia ferruginea) found in the Primitive Area.

Ancient Lodgepole Pine

A stand of 330-year old lodgepole pine was found in upper Wilson Creek in the Bighorn Crags Area. Typical older trees are about 15" dbh. Reproduction on the site is sparse and is mostly subalpine fir with some Engelmann spruce.

This stand is unique in that all other lodgepole pine stands observed in the Primitive Area were about 100 years of age or less. The site is surrounded by glacially scoured rock barrens that have apparently protected the area from wildfire. Why the stand has not succumbed to insect and disease before now is not clear. Normally, even-age lodgepole pine stands in central Idaho decimate and break up at about 100 years of age. This is due to increasing susceptibility to bark beetles and a variety of tree diseases. Therefore, the older stand described here is clearly an unusual occurrence.

Western Yew

Western yew (Taxus brevifolia) occurs as scattered individuals in a small area along the main Salmon River between Magpie and Raven Creeks and at the mouth of Arctic Creek. Their occurrence is unique in that it apparently represents an outlier of the extreme southeasterly range extension of the species. Western yew is not known to occur anywhere to the south or east of this area although it is fairly common north and west of here. It is not known to occur elsewhere in the Primitive Area. The few individuals now occurring are probably remnants of a once larger

population that has declined through gradual climatic change toward warmer and drier conditions.

The mouth of Arctic Creek is also the site of a commercial boating lodge. Because there is very little space at this site, the lodge facilities are located in the midst of the relict yew stand. It is probable that western yew will not be able to persist on this site if occupancy is continued.

V. CONTIGUOUS AREAS

A. Unit B (Head of Clear Creek)

This unit includes three headwater forks of the Clear Creek drainage. They are designated herein as the Right, Center, and Left Forks of upper Clear Creek. The area is a natural part of the Bighorn Crags mountain mass and shares the physical and biological characteristics of that area. It is strongly glaciated and of subalpine-alpine character. Any discussion of the Bighorn Crags Area found elsewhere in this report applies equally to the Head of Clear Creek Unit.

The Left Fork heads in a glacial cirque basin with very steep headwall. Gant Ridge forms a precipitous and picturesque wall along the south side of this subdrainage. There is considerable ground moraine down the Fork and relatively little stream bottom vegetation. Evidence of ancient fire can be found throughout the Fork. The upper front headwall is talus,

Photos 6-3, 6-4 and 6-5 - Left Fork of upper Clear Creek as seen from the head.

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Photos 6-3, 6-4 and 6-5 - Left Fork of upper Clear Creek as seen from the head.

outcrop, and open stands of whitebark-limber pine containing regrowth of medium size. Some subalpine fir and an occasional lodgepole pine can be found. Proceeding downstream, the forested aspect increases and lodgepole pine achieves strong dominance on the moraines. Engelmann spruce pockets occur and subalpine fir is occasionally locally dominant. Douglas-fir starts to occur near the confluence of the Forks. Grouse whortleberry (Vaccinium scoparium) is the understory dominant throughout but huckleberry (Vaccinium membranaceum) starts to occur about midway down, increases in abundance with lower elevation, and achieves local dominance in the lower reaches of the subdrainage. Taxonomic diversity of the understory is weak. Beargrass (Xenophyllum tenax) is sparse in this fork but somewhat more plentiful at lower elevations. A structural ridge (extension of Fishfin Ridge) separates the Left from the Center Fork.

Photo 5-9 - Upper cirque basin in Center Fork of upper Clear Creek.

Photo 5-5 - Lowermost cirque headwall in Center Fork of upper Clear Creek.

The Center Fork heads in a series of three stair-stepped glacial cirques having an elevational difference between each other of 300-400 feet. The uppermost basin contains several cirque lakes. The central basin has a single cirque lake (Mirror Lake), as does the lower basin.

Photos 5-7 and 5-8 - Center Fork of upper Clear Creek as seen from the head.

Overstory is primarily of scattered whitebark-limber pine with patches of subalpine fir and Engelmann spruce pockets. Below the cirque area, the drainage becomes more heavily forested with a dominance of subalpine fir. There is much more bottomland Engelmann spruce in this drainage than in the Left Fork but lodgepole pine is much less abundant. Douglas-fir occurs only on north exposures at the lower elevations. The drainage is dominated by exposed glacially scoured bedrock and a wide Engelmann spruce bottomland type. There is little morainal deposition in this part of the canyon. Beargrass is a principal understory component in the lower drainage but stops abruptly at the lower cirque headwall. In the cirque area it is replaced by elk sedge (Carex geyeri) and woodrush

The Right Fork heads in a much broader glaciated basin than do the other forks. It contains a number of cirque pockets, most of which contain cirque lakes. The overstory is sparse and mostly of whitebark-limber pine. Talus and scoured bedrock areas are common. The lower part of the drainage is forested with subalpine fir and Engelmann spruce. The stream has a steep gradient and little morainal deposition occurs.

The three forks are interconnected by trails which also connect them with the balance of the Bighorn Crags Area. The entire unit is picturesque and rugged.

B. Unit C (Lower Camas Creek)

This unit consists of two distinctly different parts separated by Camas Creek. The southern part, Woodtick Creek, is a high-gradient drainage with precipitous slopes. There is a good expression of glaciation in the head of this canyon. Several massive land slumps have occurred subsequent to glaciation. Headwalls and sideslopes are over-

Photo 4-12 - Whitebark-limber pine slopes in upper Woodtick Creek.

Photo 4-11 - View down Woodtick Creek from the head.

(Luzula parviflora) and only one small colony of beargrass was observed there. Four different kinds of huckleberry (Vaccinium spp.) were found in this drainage. The rather rare shrub rusty menziesia (Menziesia ferruginea) was also identified in the lowermost cirque basin near the lake. Bedrock in the Center Fork is of a slab type with shallow plane on the horizontal fractures and tends to slab off in stairstep fashion. It apparently underlies the drainageway bottom at generally shallow depths, thus allowing the Engelmann spruce bottomland vegetation to develop. Morainal material has apparently been moved further down canyon.

Photo 5-4 - Shrub understory in lower basin of Center Fork.

Photos 5-10, 5-11, and 5-12 - Right Fork of upper Clear Creek.

steepened but slump deposition in the upper basin has left one area of undulating hummocky terrain with a mosaic of forest and subalpine parkland vegetation. Westerly exposure slopes are forested with open or sparse stands of whitebark-limber pine. When viewed from the head, the aspect of the drainage is that of steep talus and outcrop slopes with a glacial trough bottom. In contrast, the aspect when viewed from below is that of very steep densely forested slopes. The forested northerly exposures in the lower canyon are responsible for this appearance. One major side drainage (Left Fork Woodtick Creek) is formed of a single large cirque basin with precipitous talus and bedrock outcrop walls, some mass movement, and a narrow high-gradient drainageway. Very little vegetation has established in this tributary so far.

The other main part of the unit consists of the Dry Gulch and lower Yellowjacket Creek drainages. The general character of the landscape in these drainages contrasts sharply with that of Woodtick Creek. The unit boundary crosses Yellowjacket Creek above Buckhorn and Jenny Creeks. North and west exposures in the upper part, including Buckhorn Creek, are mostly densely forested with Douglas fir/pinegrass being the dominant community type. Typical overstory dominants are 150-200 years of age and the area appears to have been undisturbed by wildfire, grazing, or other external interference for a long time. A few small stands and single lodgepole pine trees occur on the slope and into the

Photo 9-8 - Typical Douglas-fir pinegrass community type.

Photos 9-9 and 9-10 - Panoramic view of the main slope west of Yellowjacket Creek.

head of Dry Gulch. South and east exposures are dominated by an outcrop/curlleaf mountain mahogany type with only a sparse cover of trees. Extensive burns have occurred high on the slopes. These are now occupied by ceanothus (Ceanothus velutinus)brushfields. The lower canyon area is xeric, ledgy and generally unforested.

Photo 9-11 - Old burned area on the upper west side of Dry Gulch.

The bottomland is mesic and occupied by alder/thimbleberry and ninebark/mesic shrub communities. Patches and stringers of Engelmann spruce and black cottonwood occur in the bottom. A few scattered ponderosa pine occur on xeric colluvial side slopes.

The west side of Dry Gulch is forested in the upper part. A large

Photo 10-3 - Nonforested slopes in lower Dry Gulch.

Photo 10-1 - Old burned area on the east side of Dry Gulch.

burn here is now occupied by ceanothus brushfield with scattered Douglas-fir reproduction starting to reoccupy the site. The lower west side is mostly nonforested with a high rim of ledges and slopes dominated by big sagebrush, arrowleaf balsamroot, and bluebunch wheatgrass. Some patches of cheatgrass brome occur in the lower part but they are not abundant and are confined mostly to small spur ridges. The vegetation here has been altered somewhat by past grazing stress. The upper east side is forested with Douglas-fir. The central part is a large old burn that is still mostly in mountain grassland and brushfield types but with Douglas-fir reoccupying scattered portions of the burn. The lower part is mostly hot, xeric, nonforested slopes dominated by big sagebrush, arrowleaf balsamroot, and bluebunch wheatgrass. A belt of aspen occupies most of the canyon bottom in Dry Gulch with some patches also found in tributary drainages on the west side. A few black cottonwood are scattered in the bottom but conifers are scarce.

The m ain slope into Camas Creek is very hot, dry, and steep with intermittent ledgy areas. Dominant vegetation is cheatgrass brome, wheatgrasses, balsamroot, with some curlleaf mountain mahogany occurring in the ledges.

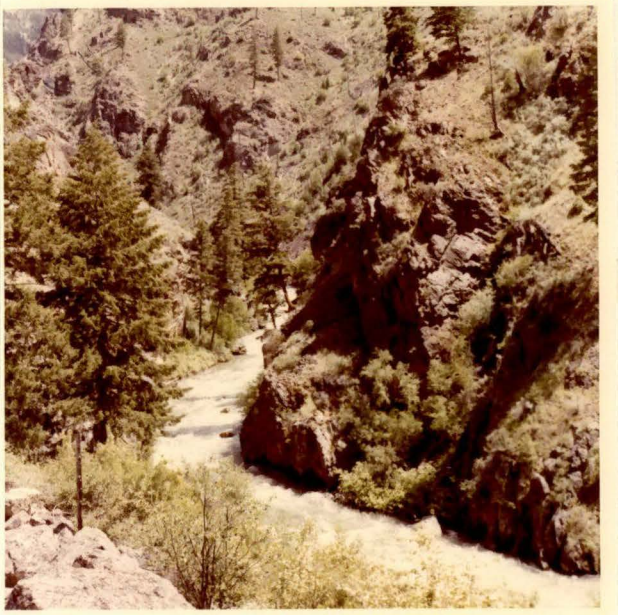


Photo 10-4 - Camas Creek above the confluence of Yellowjacket Creek.

C. Unit D (Rapid River-Loon Creek)

The western part of this unit, including the lower Rapid River and Little Loon Creek drainages, is a steep, rugged, and strongly dissected landscape exposed generally to the northward. It extends from the mid

Photo 4-6 - Douglas-fir/pinegrass type common in the area.

Photo 4-4 - Subalpine zone in Sheep Mountain area.

Douglas-fir zone at lower elevations, through the spruce-fir zone, and into the whitebark-limber pine zone on peaks and ridges at the highest elevations. An elevational gradient of one mile (4000' to 9200') occurs within a horizontal distance of 6-7 miles.

The eastern part includes the east-west drainages of Jack Creek and Cabin Creek, both tributaries of Loon Creek.

Jack Creek is generally clothed with Douglas-fir forest from top to mouth on both north and south exposures. North slopes have moderately dense stands of Douglas-fir of mixed ages. South exposures have more open stands with some open slopes at lower elevations. These generally tend toward big sagebrush/bluebunch wheatgrass but have diverse plant communities of forbs and shrubs locally. Two old fire scars were observed in upper Jack Creek. One was restocked to young Douglas-fir. The other was doghair lodgepole pine with some subalpine fir reproduction in the core of the burn, grading to mixed lodgepole pine-Douglas-fir, and finally to pure mixed-age Douglas-fir. Bottom areas become quite shrubby as do some of the lower slopes. One narrowleaf cottonwood was observed in lower Jack Creek bottom.

The lower part of Cabin Creek below Kelly Creek has moderately dense Douglas-fir forest on the north exposures. South slopes support scattered Douglas-fir with large open hillsides of big sagebrush/bluebunch wheatgrass. These areas are winter range for elk and deer and the vegetation has been modified by past grazing. Sagebrush has increased in density, bitterbrush and wheatgrass have decreased, and cheatgrass brome has come in as a major component of the composition. Idaho fescue was probably an original dominant on toeslopes and bottoms and is still present, but in lesser amounts.

Photo 4-7 - South exposure Douglas fir/sagebrush in lower Cabin Creek.

Photo 4-8 - North exposure Douglas-fir in lower Cabin Creek.

Talus slopes increase in abundance and bedrock outcrops become more precipitous on both exposures from Kelly Creek to the upper part of the old Cabin Creek burn at 6000-feet elevation. The burn extends almost from ridge to ridge and many snags and stumps remain. Only scattered Douglas-fir has come back in. There are some patches of snowbrush ceanothus and mixed shrubs but much of the burn is still quite open and scabby. At the 6000-foot level the burn narrows to a strip extending on up the bottom. Sideslopes above the burn are pure Douglas-fir on both exposures. Pinegrass forms the most common understory community. Pockets of Engelmann spruce and an occasional subalpine fir occur along the bottom. Sapling sized lodgepole pine occurs in patches as a seral invader. Along this reach, all lodgepole pine stands have Douglas-fir reproduction in the understory.

The burn ends at about 7000-feet elevation. Engelmann spruce continues in patches along the stream and lodgepole pine of large pole-size or larger are scattered through the bottom. Douglas-fir is the principal

overstory species in the bottom and moderately dense mixed-age Douglas-fir/pinegrass communities occupy the slopes.

At about 8000-feet elevation the subalpine zone is abruptly encountered and subalpine fir and whitebark-limber pine become dominant. Above 8500 feet, open whitebark-limber pine stands with sparse understory are dominant.

Photo 4-9 - View of Cabin Creek from the head.

Photo 4-10 - Whitebark-limber pine headlands in Cabin Creek.

The position of lodgepole pine in community structure in this drainage sheds some light on its role as a seral species in the general area. It is probable that a few lodgepole pine trees occurred in the area by ecological chance. In fact, a few specimens of larger size still occur in the area above the burn. These provided a seed source for local establishment into the big burn. Succession into older burns probably accounts for the older lodgepole pine stands in the 7000-to 8000-foot reach. The successful establishment of Douglas fir reproduction under the lodgepole pine indicates a single generation life for

these stands unless reburn occurs. In the absence of further wildfire, the sites will be reoccupied by Douglas-fir.

D. Unit E (Porphyry Creek-Mackay Bar)

This unit was not investigated except by aerial overflight and is not discussed in this report.

VI. HORSE CREEK UNIT (UNIT A)

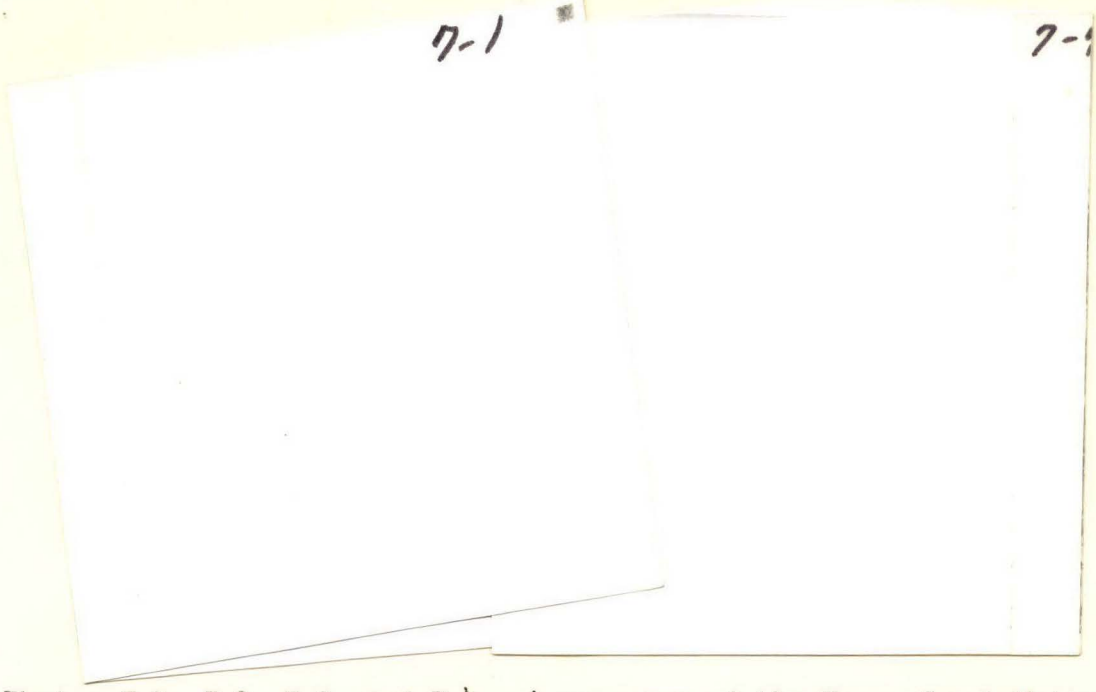
The Horse Creek unit divides logically into two parts, an eastern section and a western section. The separation follows roughly on a north-south line from Parker Mountain to Skunk Camp. Characteristics of the two parts are described separately.

The eastern section is predominantly forested with coniferous species. For the most part, the topography is steeply sloping with generally narrow ridgetops and valley bottoms. Most of the area is in the Douglas-fir zone with the spruce-subalpine fir zone occurring on the higher slopes and ridges. The whitebark-limber pine zone probably occurs on some of the highest ridges but is very limited in extent. No nonforested types of any consequence were observed in this section although some ledge outcrop areas occur. Some south exposures and steep upper slopes are only sparsely forested.

The Douglas-fir zone below about 6800-feet elevation contains some residual Douglas-fir overstory but the majority is now occupied by seral lodgepole pine stands of various ages. Most of the lodgepole pine is in the 40- to 80-year age bracket. An occasional ridgetop of open mature Douglas-fir forest was observed but such sites are scarce. Understories in Douglas-fir and lower elevation lodgepole pine are commonly dominated by pinegrass (Calamagrostis rubescens).

Fire patterns and seral lodgepole pine stands extend well into the spruce-subalpine fir zone. Subalpine fir and higher elevation lodgepole pine understories tend more toward a dominance of grouse whortleberry (Vaccinium scoparium), beargrass (Xerophyllum tenax), and elk sedge (Carex geyeri).

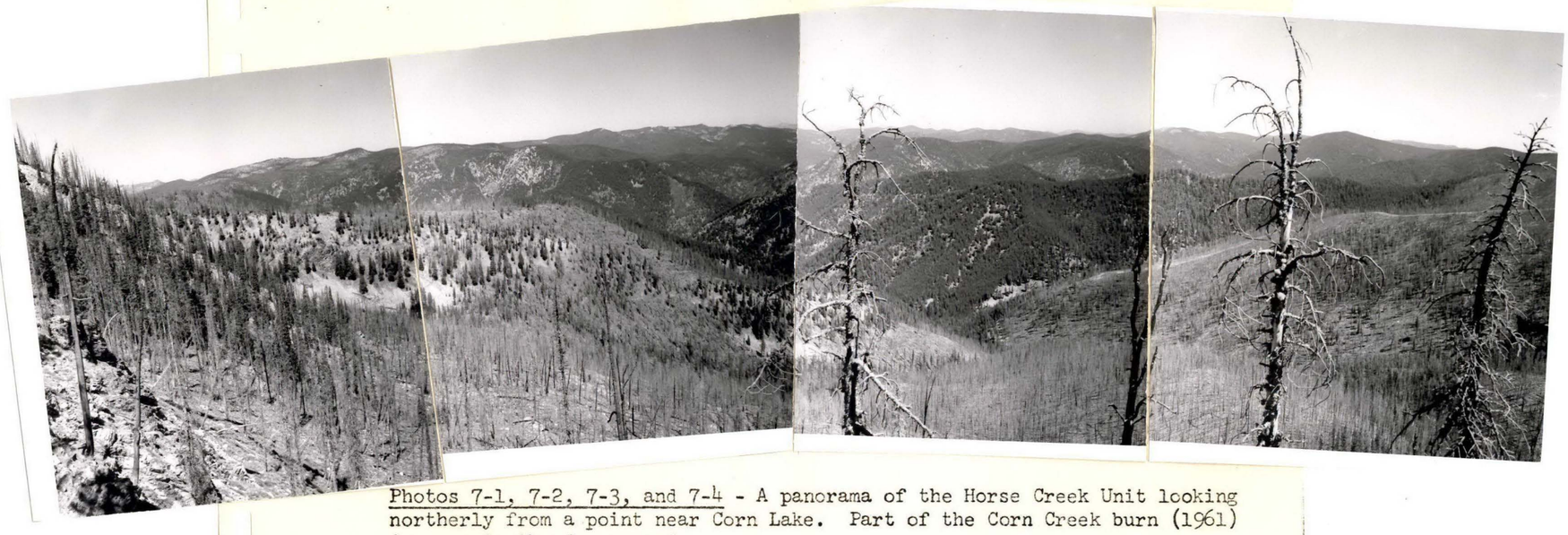
7-1



Photos 7-1, 7-2, 7-3, and 7-4 - A panorama of the Horse Creek Unit looking northerly from a point near Corn Lake. Part of the Corn Creek burn (1961) is seen in the foreground.

7-5

Photos 7-5, 7-6, and 7-7 - A panorama of the Horse Creek Unit looking westerly from Creans Lookout. The eastern boundary of the unit is marked on the photos.



Photos 7-1, 7-2, 7-3, and 7-4 - A panorama of the Horse Creek Unit looking northerly from a point near Corn Lake. Part of the Corn Creek burn (1961) is seen in the foreground.

Photos 7-5, 7-6, and 7-7 - A panorama of the Horse Creek Unit looking westerly from Creans Lookout. The eastern boundary of the unit is marked on the photos.

Fire patterns are a prominent feature of the general landscape. Although the matter was not investigated in depth, it appears that most of this area has burned over within the past 100 years.

The western section is an area of much greater contrast and includes a full spectrum of vegetation zones from bunchgrass through whitebark-limber pine. There is a much higher level of landscape diversity here than in the eastern section. The topography is rugged and outcrop areas are numerous.

Photo 9-6 - Terrain in lower Horse Creek.

Photo 9-3 - Mid-elevation terrain in Horse Creek.

Nonforested bunchgrass slopes are characteristic of southerly exposures in lower Horse Creek. Bluebunch wheatgrass (Agropyron spicatum), arrowleaf balsamroot (Balsamorhiza sagittata), and cheatgrass brome (Bromus tectorum) are the principal dominants but a large variety of forbs and grasses occur. Herbage yields approach 800-1000 pounds dry weight per acre. Bitterbrush (Purshia tridentata) is notably absent although it is normally expected in this community type.

Photo 9-7 - Bluebunch wheatgrass/ balsamroot community type.

Photo 9-1 - All-aged ponderosa pine community.

On an elevational gradient upslope, a rather narrow zone of ponderosa pine is encountered next. The overstory is all-aged and fairly open. Understories are dominated by spreading dogbane (Apocynum androsaemifolium), arrowleaf balsamroot, lupine (Lupinus wyethii), and pinegrass. Patches of dense cheatgrass brome are common in the canopy rain shadow of mature trees. Herbage yields may reach 800 pounds dry weight per acre.

Above the upper boundary of this zone is a fairly narrow belt of Douglas-fir zone. The overstory may be open or closed and the understory is usually dominated by pinegrass or elk sedge. Herbage yields of 1000 pounds dry weight per acre are typical on open sites. Some sites support an abundance of forb species as well and yields on those sites may reach 1300 pounds dry weight per acre.

A rather broad, but often discontinuous, expanse of spruce-subalpine fir zone is encountered at about 6700-feet elevation. Pinegrass and elk sedge understories are common and beargrass communities may be found in old burned areas.

Photo 8-11 - Beargrass type and lodgepole pine reproduction in an old burn.

Photo 8-12 - A Douglas fir/pinegrass type in Colt Creek.

Upper elevations above 7500-8000 feet form a region of glacially scoured terrain and whitebark-limber pine communities. Large areas of exposed barren bedrock are common. This zone was viewed from the air but was not investigated on the ground. No further discussion is presented here. It is assumed that the characteristics of the zone are similar to those found elsewhere in the Primitive Area.

VII. APPENDIX

STUDY SITE FIELD NOTES (81 Writeups)

Unit 1 (Chamberlain Basin)	- 19 Writeups
Unit 2 (Salmon River breaks)	- 12 Writeups
Unit 3 (Monumental Creek)	- 10 Writeups
Unit 4 (Bighorn Crags)	- 11 Writeups
Unit 5 (Middle Fork breaks)	- 9 Writeups
Unit 6 (Cache Creek Basin)	- 1 Writeup
Unit 7 (Big Marble Pistol)	- 4 Writeups
Unit A (Horse Creek)	- 7 Writeups
Unit B (Head of Clear Creek)	- 0 Writeups
Unit C (Camas Creek)	- 1 Writeup
Unit D (Rapid River-Loon Creek)	- 7 Writeups
Unit E (Porphyry Creek-Mackay Bar)	- 0 Writeups

NOTE: Only part of the above data sheets are included in various copies of the report.